CONSULTING ASSISTANCE ON ECONOMIC REFORM II

DISCUSSION PAPERS

Faster More Equitable Growth: The Relation Between Growth in Agriculture and Poverty Reduction

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THE RELATION BETWEEN GROWTH IN AGRICULTURE
AND POVERTY REDUCTION

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(Prepared for Conference on Development Assistance in the 21st Century; Challenging the Conventional Wisdom on Assistance and Development; HIID, Cambridge, September 30,1999 - October 1, 1999)

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It is now clear that high rates of economic growth may rapidly reduce the proportion of the population in absolute poverty. In low-income countries, rapid overall growth is likely to be accompanied by rapid growth of the agricultural sector, because virtually all low-income countries have large agricultural sectors encompassing the majority of the population. There has been a tendency to generalize that *economic growth* reduces poverty, when in fact it is the direct and indirect effects of the *agricultural growth* that accounts for virtually all of the poverty decline.

This confusion is harmful to the objective of poverty reduction for three reasons: (1) rapid agricultural growth requires substantial public investment specific to the agricultural sector; (2) foreign aid has a particularly important role to play in achieving a low-income country focus on agricultural growth; (3) current fashions in economics tend to discourage sector specific investments as interfering with market processes that are thought to be efficiency increasing.

The marked slowing of poverty reduction in Asia during the past decade and increasing poverty in Africa are both the result of neglect of agriculture by governments and foreign aid institutions. It is urgent for the poor that the underlying policy errors be corrected.

We have long had theory that explained why agriculture is critical to poverty reduction. Now that there is experience with a few decades of rapid growth in many countries the empirical record is now available for corroborating that theory.

This paper reviews the wealth of data with respect to contrasting sectoral growth effects on poverty reduction; relates those data to the underlying theory; and, draws conclusions about policy for poverty reduction. Both the data and the theory will be examined for circumstances in which agricultural growth and hence overall growth do not reduce poverty.

The conclusion is that there is such a thing as "a pro-poor growth strategy;" it is faster than alternative strategies; it requires specific policy focus; and, it brings rapid decline in absolute poverty.

The Basic Data on Growth, Sectoral Growth, and the Reduction of Poverty

A recent wealth of data related to changes in poverty levels within and across countries has permitted increased intensity of study of factors associated with change in poverty and facilitated conclusions about causality. Until recently there were insufficiently long periods of rapid increase in incomes in a sufficient range of contemporary low-income countries to study causes of poverty change, except by the use of isolated micro studies. Improvements in methodology have also helped extract more information from the data.

The initial basis for current cross-section analysis was the continuing set of large-scale sample surveys carried out throughout India by the Indian Statistical Institute. These studies covered diverse physical,

economic, and social conditions, and have finally extended into a recent period of rapid economic growth.

Next, a large, cross-national data set was developed by Klaus Deininger and Lyn Squire (1996) that also included ample countries with rapid economic growth and with a wide range of structures of that growth. In addition, data for a few Southeast Asian countries that have experienced rapid growth has become available, as has data for China covering its recent rapid growth. Together they tell a detailed, data based story of the sources of poverty decline.

Initially only the relation between overall growth and poverty was analyzed. The breakthrough in knowledge that shows it is the structure of growth that matters comes from a series of empirical studies by Martin Ravallion and his colleagues at the World Bank. These studies examine the separate effect that growth by sector of the economy has on poverty. Further studies, using a quite different methodology, by Peter Timmer, then at Harvard University, and his colleagues, provide independent corroboration of the basic relationships in the Ravallion studies as well as additional insights. It is the consistency of results from varied studies with each other and with earlier micro studies and the further consistency with prior theory that gives such power to the findings.

In this section, the data will be briefly summarized for the general relationship between growth and poverty; and we will examine the effect of different structures of growth, with particular emphasis on the role of agricultural growth. We will then review the modifying effect on these relationships arising from differing initial income distributions and the presence of lags in the relationship.

Given the importance of agricultural growth shown by the preceding data, attention will be given to the evidence about the size of multipliers from agricultural to non-agricultural growth and the role of public expenditure in agricultural growth.

Defining Poverty

The focus in western countries has been on the relation between growth and the distribution of income, that is inequality of distribution, rather than on the proportion of the population falling under some absolute poverty line. That choice of focus is a philosophical one. Amartya Sen makes the philosophical case that in very poor countries it is the incidence of absolute poverty that matters most (Sen 1976). In any case, support for foreign aid and mass concern generally is on famine and inadequate food intake, and hence on absolute poverty.

Absolute poverty has long been defined in terms of the income required to provide a minimal food intake for a healthy life and the associated consumption of those so poor that the minimum food intake is all they achieve (Dandekar and Rath 1971). In this paper, the focus will be on absolute poverty, although the initial discussion will also review the data on growth and income distribution.

The traditional measurement of absolute poverty is the proportion of the population falling under the defined poverty line. Refinements examine the distribution of those under the poverty line. Generally little difference is found in the relation between growth and the variant measures. This analysis will therefore concentrate on the simpler measure—the proportion of the population falling under the poverty line. That is, we will ask to what extent has the proportion of the population obtaining inadequate food intake for a healthy life changed.

Overall Growth and Poverty Reduction

The traditional interpretation of basic data on economic growth led to the conclusion that in the early stages of economic growth inequality tended to increase and decreased only during later stages of growth. Most of the analysis that led to this conclusion was based on data from developed countries. This pattern is often called a *J curve*, for its distinctive shape, or the Kuznets curve, for the data generated by Simon Kuznets that was thought to document this relationship (Kuznets 1955).

Even before the current wealth of data on poverty reduction, time series for Taiwan showed that its pattern of growth provided decreased inequality right from the start (Lee, 1971). Now that the relation of agricultural growth to poverty reduction is better understood and documented, the Taiwan case is particularly important in its lessons about process.

A range of literature from 1971 to 1995 covering developing countries seemed to support the Kuznets hypothesis about worsening of income distribution in early stages of growth. More recent literature based on more sophisticated data analysis finds contrary results. Bruno, Ravallion and Squire (1996) reviewed 63 surveys for 44 countries spanning 1981-92 and found no support for the worsening of income distribution. They further reviewed data from 45 countries for which time series data were available and found the that bulk of variation in income distribution was accounted for by differences among countries and only 7 percent was accounted for by variation over time within countries. From these data we see that the distribution of income is quite stable over time within countries.

Sharma and Poleman (1993) provide important evidence for India that the distribution of income (as reflected in the Gini coefficient) varies substantially among sectors and hence, that changing the rates of growth for sectors will change the Gini coefficient even if the coefficient is stable for each sector. We will deal with structural aspects later.

Important to the later discussion, they show the increments to crop income alone skews the distribution towards the well to do, with a Gini coefficient of 0.86, far above the Gini coefficient for the economy in total. That finding is of course consistent with the views of early critics of the green revolution.

In sharp contrast to crop income, the Gini coefficient for dairy production, which is very important to the poor in India because of its labor intensity, is 0.11. That is an extraordinarily low Gini coefficient. And,

the Gini coefficient for off-farm work in rural areas is a still low 0.22. Thus, when rising agricultural incomes are spent in those sectors they redistribute income.

India has the best, and perhaps only long-term set of comparable data on income distribution in a large developing country encompassing considerable geographic variation in the various poverty related variables. These data give "no sign that higher growth rates in India put upward pressure on overall inequality (Bruno, Ravallion and Squire 1996)." A large number of other studies confirm that growth does not worsen income distribution and therefore it does reduce absolute poverty (Fields, 1989, World Bank, 1990, Squire 1993, Lipton and Ravallion 1993, Ravallion 1995).

Timmer shows, based on sophisticated analysis of the Deininger Squire (1996) data, that "each 1 percent increase in per capita income for the overall population is matched by a 1percent increase in income of the bottom forty percent in the income distribution" (Timmer 1997). That is, growth is neutral to the distribution of income; all income classes participate equally.

Datt and Ravallion (1998) contrast for India the period 1958-75 when real consumption per person declined at the rate of .93 percent per year from 1976-94 when real consumption grew by 1.76 per capita per year. In the former period, the proportion of the population in poverty increased at a rate of 1.18 percent per year, while in the latter period it declined at 1.91 percent per year.

Timmer (1996) also shows that for Indonesia between 1970 and 1995, a 25-year period, the income of the lowest quintile in income distribution rose from a level equal to half the poverty line to more than twice the poverty line. The two lowest quintiles had a rate of growth of income of 6.1 and 6.8 percent per year, while the average was 4.9. Thus, not only was absolute poverty reduced rapidly, but also the distribution of income became more equal.

With a quite different measure, analysis of 20 countries shows an elasticity of poverty reduction with respect to an income increase of 2.12 percent (Bruno, Ravallion, and Squier 1996). Ravallion estimated the elasticity of poverty reduction (proportion of the population below the poverty line) with respect to income for India as -2.2 percent (Datt and Ravallion 1989, 1983 data) and for Indonesia as -2.1 percent (Ravallion and Huppi 1989, 1984 data). A figure of -2 means that starting with 40 percent of the population below the poverty line and a 1 percent rate of increase in the per capita income; the ratio would drop to 39.2 percent in the first year. It would drop to 36 percent with a 5 percent growth rate, and would drop in half in seven years.

Ravallion and Huppi (1989) show for Indonesia between 1984 and 1987, that the proportion of the population under the poverty line declined from 33 percent to 22 percent—that is a drop of one-third in three years.

Ravallion and Chen (1996) show for China, a generally higher elasticity of poverty reduction with respect to average consumption. Using the World Banks definition of $1.00 per day, which is

comparable to the measures that start with minimal calorie intake and the goods and services that go with that in the consumption basket of the poor, the elasticity is -3.1 percent. That is a 10 percent increase in average consumption drops the proportion in poverty by 31 percent.

A broader definition that brings half of the population under the poverty line drops the elasticity to -2.6—that is a 10 percent increase in average consumption that brings about a 26 percent decrease in poverty. The elasticity drops substantially for definitions that place a higher proportion of the population in poverty—in half for one that places 75 percent of the population in poverty, compared to the 2.6 for 50 percent in poverty. Thus, growth brings disproportionately large reductions in poverty for the groups furthest below the poverty line.

All the preceding studies calculate relations between growth and more complex definitions of poverty and in every case the impacts are roughly the same, or somewhat more favorable for the very poorest.

If the distribution of income does not change with growth, then a simple calculation shows to what extent population is lifted above any given absolute income line. It is on the basis of a calculated average elasticity that the World Bank estimates the poverty-reducing effect of growth. As we will see later such simple estimates shift attention away from the critical policy requirements for poverty reduction. In particular, it distracts attention from the requisites of pro-poor growth.

It is notable that while studies for all countries show a major impact of growth on poverty reduction, there is nevertheless substantial variation in the magnitudes of the poverty decline. The variation suggests that something important is being hidden. That is the subject of the next section.

The Structure of Growth - Poverty and Agriculture

The structure of growth matters very much to the extent that poverty reduction is achieved. Two studies give detailed data on this issue—Ravallion and Datt (1996) for India, and Timmer (1997) for a cross-section of a large number of countries. The two studies are quite different methodologically and in source of data, but find the same striking relationship

Preceding the studies of Timmer and Ravallion, Montek Ahluwalia (1978) presented data showing that increased agricultural output per head of the rural population decreased poverty. Dharm Narain furthered this analysis with important conceptual additions (Mellor and Desai 1985). He too, shows a major effect of agricultural growth in reducing poverty. Mellor and Desai (1985) elaborate at length on the relations, the supporting data, and alternative views.

For both Ahluwalia and Narian, the data cover a period when both agricultural growth and poverty fluctuated considerably, but there was not sustained agricultural growth or poverty reduction. Thus, their analyses essentially deal with a situation not of steady growth but of fluctuations in income and poverty.

The Ravallion and Datt (1996) work for India is recent enough to include periods with far higher agricultural growth rates than the earlier studies as well as sustained growth beyond previous peaks, and declines in poverty far beyond previous troughs.

Ravallion and Datt relate change in crop yields to poverty. They show that reduction in poverty is a result of growth within sectors, not the transfer of labor from a low earning sector to a high earning sector. The latter is the basis for the Kuznets J curve.

What is truly strikingly revealed in Ravallion and Datt, is that agricultural growth and tertiary sector growth have a major effect on poverty reduction, and manufacturing growth does not. Further, the service sector growth that has the favorable effect, is the small-scale portion of that sector, which we will show later, is itself closely related to agricultural growth—84.5 percent of the substantial poverty reduction in India in the period of analysis was due to agricultural growth. They also show little effect of the many programs that directly target the poor.

Growth of manufacturing in India has historically been biased towards large-scale capital intensive industry, so the manufacturing data may be somewhat biased as compared to a market oriented structure (Mellor 1976). But, the Timmer (1997) data confirm the Ravallion Datt findings for a large cross-section of countries.

The various studies show that industrial growth does reduce poverty from the direct effect of income increase, but it concurrently has an unfavorable effect on the distribution of income thereby reducing the effect on the poor. Agricultural growth, including its indirect as well as direct effects, does not have the unfavorable distributional effect.

In a later article Datt and Ravallion (1998b) also relate rural wage rates and food prices to poverty. All three have a substantial effect. Of course, rural wages are importantly influenced by incomes of farmers, as we will point out later, and similarly food, prices are related to agricultural production. They show that wage rates are important to poverty reduction and that higher farm productivity is closely associated with higher wage rates. Similarly, food prices are important and higher farm productivity reduces food prices. Thus, it is farm production that drives poverty reduction. In a later section, we will elaborate on this relation of agricultural growth to non-farm employment and hence to wage rates.

Peter Timmer (1997) uses the Deininger-Squire data set for poverty and purchasing power for 35 developing countries and relates those data to agricultural GDP per capita. "A one percent growth in agricultural GDP per capita leads to a 1.61 percent increase in per capita incomes of the bottom quintile of the population." (p.3). Unlike Ravallion and Datt, Timmer shows a positive elasticity for industrial GDP, but the agriculture elasticity is 38 percent larger than the industrial elasticity.

The 27 countries and 181 observations (studies) from 1962 to 1992, in the Timmer sample of the Deininger Squire data include 3.3 billion people in 1995, or two-thirds of the population of low and middle-income countries as classified by the World Bank (p.7, Timmer 1997). On average, agriculture accounted for 25 percent of TGDP and 51 percent of the labor force. Countries are roughly equally divided among regions of the world, with some under-representation of Africa.

Note that Ravallion and his colleagues relate agricultural output per unit of land to poverty reduction, while Timmer relates agricultural output per worker. Ravallion provides a sound theoretical argument for his approach. And, the mechanism of agricultural output growth is largely increased yields of specific crops and increased intensity of agricultural production, consistent with Ravallion's argument.

However, because we will focus on the linkage to non-agricultural growth, both in interpreting the Ravallion and Timmer data and in employment calculations, it is what is happening to incomes of farm families that is important. That is better measured by income per worker.

Ravallion (1998) focuses on the real labor earnings per acre and agricultural productivity in agriculture. His model brings in three variables, the productivity of labor in agriculture, yields in agriculture, agricultural wage rate, and food prices. The former two have about equal weight and the food price elasticity is also high. Of course, as we will elaborate later, all three are related to agricultural production and incomes.

Yield is shown to have a major effect on the real wage rate, and the effect is eight times larger in the long run than the short run, showing that it takes time for this important component of poverty reduction to show itself.

As we will point out below, this lag is too much if the wage effect is entirely from agricultural labor where the tightening of the labor market would be immediate. It is consistent with the argument presented below, that the wage effect comes from the agricultural stimulus to non-farm employment. This point is neglected in the empirical data but not in the theoretical arguments.

While the emphasis here is on the simple measure of the proportion of the population under the poverty line, it is notable that agricultural growth reduces inequality among the poor as well as lifting the poor above the poverty line.

Ravallion's data do show that non-agricultural output growth explains decrease in poverty, but only if agricultural output per acre is excluded as a variable. That means that the non-agricultural output stimulated by the agricultural output is important but gets picked up by the agricultural yield figure when the latter is included. That implies that the non-agricultural growth that reduces poverty is that part stimulated by the agricultural growth.

In the Timmer (1997) sample of countries, output per capita is three times higher in non-agriculture as agriculture. This means that agricultural growth does much more for employment and poverty reduction than non-agricultural growth while non-agricultural growth has much more of an impact on over-all growth rates.

Datt and Ravallion (1998) do not find a declining trend in the elasticity of employment with respect to agricultural output. The power of the relationship holds up over time. Thus, the current decline in the rate of poverty reduction is due to decline in the agricultural growth rate, not due to declining power of that variable. See Cornea (1999) for data on the decline.

Huppi and Ravallion (1990) find that wage earnings of poor self-employed farmers grew faster than earnings from any other source and were a major cause of decreased poverty. Wage earnings of poor farmers in Central Java doubled over three years. Since wage rates changed little in the period the effect was largely from increased employment. Most of the employment growth came from a booming rural non-farm sector. Growth in cash crop income was more important to the non-poor than the poor (strengthening the case that it is the indirect effects of agricultural growth that affects the poor).

Ravallion (1989) shows that the poor lose from agricultural price increases in the short run, but not in the long run. That is consistent with price increase stimulating increased demand for labor through increased agricultural production in the long run (See also Mellor 1968 and 1978).

The data show clearly that it is growth of agriculture that reduces poverty, not growth in general. One misleading interpretation should be avoided. Typically high growth rates are achieved when agriculture grows rapidly. That is because the resources used for agricultural growth are only marginally competitive with other sectors and so fast agricultural growth tends to be additive to growth in other sectors, as well as being a stimulant of growth in the labor surplus non-tradable sector (Mellor 1966 and 1976).

The countries that grew the fastest from 1985 to 1995 experienced a narrowing of the income gap (Timmer 1997). That means that agricultural growth resulted in faster over-all growth and an improvement in the income distribution. Thus, emphasizing agriculture in order to improve income distribution does not result in slow growth. The sectors are more complementary than competitive. Conversely, leaving out the forces that accelerate agricultural growth, as has been increasingly the case in the past decade provide slower growth and leave out the poor.

The average elasticities cited at the beginning of this section are strongly influenced by high agricultural growth rates. Thus, it is grossly misleading to think of those elasticities as applying to some average growth rate. Those are substantially the elasticities when agriculture grows rapidly.

Thus, agricultural productivity increase has a major effect in reducing poverty, and the effect is relatively greater in its impact on the poorest and the distribution of income among the poor. Industrial growth has

much less, or even no effect in reducing poverty. Service sector growth has no effect for the large-scale part and a substantial positive effect for the small-scale portion.

If growth occurs leaving the agricultural sector out, two onerous burdens fall on the poor. First, the over-all growth rate will be much lower and second, the part that reduces poverty will be missing. As we will show later, rapid agricultural growth is more easily achieved now than some decades ago, but it does require overt actions by government.

The Structure of Growth—Rural Urban

Ravallion and Datt (1996) also analyze the Indian data according to urban and rural income. They find that the rural urban population shift (the Kuznets effect) has little effect in reducing poverty, nor does urban growth.

Urban consumption growth increases inequality in urban areas, while rural growth improves the urban distribution. That is presumably because increased rural incomes reduce the queue of urban unemployed (see Harriss and Todaro, 1970). Rural growth of course has a major impact on reducing rural poverty. Ravallion and Datt (1996) find that rural growth reduces both urban and rural poverty, but that urban growth does not reduce rural poverty.

The impact of rural growth on poverty reduction is nearly three times as great as urban growth. The point, as we will emphasize later, is not that rural growth should be pursued in place of urban growth, but rather that agriculture and the rural sector should not be neglected. If it is neglected, employment will increase little and poverty will increase substantially.

Lags

Datt and Ravallion (1998) find significant lags in the impact of agricultural growth on poverty. The effect on rural wage rates is eight times as large in the long run as the short run and the over-all effect on poverty reduction is five times as large. The over-all lag is importantly influenced by the lag in adjustment of wage rates. The wage rate adjustment presumably lags because of lag in increased employment, which is in turn due to the expenditure patterns for increased farm incomes.

About half of the long run effect of increased agricultural output on the welfare of the poor occurred within three years of an initial gain in farm yield (Ravallion and Datt 1996). As we shall see later, this is powerful evidence to support that it is the agricultural stimulus to non-farm employment that is driving the poverty decline.

Asset Distribution

The literature generally notes the impact of skewed distribution of income and of assets in slowing growth. That in turn is seen as slowing poverty reduction. The more detailed data show that agricultural distribution is at the heart of the problem.

Timmer finds a major effect of income distribution on the effect of agricultural growth on poverty reduction. In the most revealing part of his exposition, Timmer shows that if agriculture grows at the (relatively slow) rate of 3 percent per year, and non-agriculture grows at a rate that gives an overall growth at 5 percent, then countries with small gaps between the top and bottom quintiles, the bottom fifth in the income distribution experiences a 241 percent increase in income after 25 years, while the top fifth experiences a 211 percent increase. However, if the income gap between these quintiles is large, more than twice the average per capita income, the incomes of the poorest quintile increase by only 75 percent while the top quintile increase by 273 percent.

"Agricultural growth, when the distribution of income is quite equitable, raises the average contribution to growth for the five income level quintiles by 5.5 percent, and the elasticities decline for each successively higher income quintile, confirming an improvement in the distribution of income." (Timmer 1997).

The rich in countries with large income disparities benefit considerably from agricultural growth, while the poor are not reached by either the agricultural or non-agricultural sectors (Timmer 1997, p.22). Indeed, the 95 percent confidence interval includes zero response of income of the poor to growth from either sector.

When income growth is highly skewed to the rich, growth in agricultural productivity is no more successful in reducing poverty than growth in other sectors (Timmer 1998). Again, this finding is important to understanding process as developed later in this paper.

Ravallion (1997) shows that high inequality provides lower growth and even lower reduction of poverty. Birdsall et al. (1995) show the same results. She shows that the elasticity of poverty reduction with respect to growth declines sharply with increasing inequality. With a very low Gini coefficient of 0.25 the elasticity is a very high 3.33, while it drops almost in half to 1.82 with a Gini coefficient of 0.59.

Despite his pioneering work on the impact of agricultural growth on poverty Ravallion did not bring that structure into analysis of the effect of inequity on poverty. We will show later that the importance of income distribution confirms an important part of the relation between agricultural growth and poverty reduction.

Agricultural Growth Multipliers

The multipliers to output and employment from increased agricultural incomes are important because they tend to be oriented towards non-tradable goods and services that use underemployed labor. Thus, they stimulate a sector that can not be stimulated by increased foreign demand and mobilize resources that would otherwise be idle. Those resources are primarily labor and hence the source of poverty reduction.

Block and Timmer's model of the Kenyan economy shows the multipliers from agricultural growth to be three times as large as those for non-agricultural growth (Block and Timmer 1994). That is because the linkages from agricultural growth tend much more towards the domestic economy and within that use of resources, are underemployed as compared to the non-agricultural sector.

The multiplier effects are largely worked out within four years. The multiplier they find for agriculture is 1.64; that for non-agriculture is 1.23. Note that the multiplier to the sectors directly stimulated by agriculture will be much larger than the over-all multiplier since they occupy a smaller proportion of the economy and receive a large impact.

Multipliers for agriculture from data are 1.8 for Malaysia and 1.5 for Sierra Leone and Nigeria (Hazell and Roll 1990), and for India 1.6 (Hazell, Ramaswamy, and Rajagopalan 1991). Rangarajan (1982), using the same model as Timmer, found a multiplier of 1.7 for agriculture, compared to 1.5 for industry (Rangarajan 1982).

Delgado (1998) notes a finding of Hazell and Roll (1983), that because of the low level of commercialization in African agriculture, the multipliers to the non-farm sector are much weaker than in Asia. Delgado then goes on to show that a high proportion of agricultural output in Africa is comprised of non-tradables and the multipliers to the non-tradable sector are indeed as high as in Asia.

Delgado (1988) points out that because of the high transactions costs, particularly for transport, the high-income elastic, high value commodities such as livestock and horticulture are largely non-tradables, particularly outside the region—in this case West Africa. He also finds that much of the basic cereal production is non-tradable because of specifications that are not well suited to international markets. Thus, increased farm incomes from increased productivity of resources from technological change cause income increases that are largely spent for goods and services that otherwise lack effective demand and that mobilize underemployed local resources.

The conclusion from the Delgado analysis is that the multipliers to non-tradables from agricultural income growth ranges are from 1.96 for Niger, to 2.88 for Burkina Faso. The impact of getting agriculture moving is 2 to 3 times as large as the initial agricultural growth.

Public Sector Investment and Agricultural Growth

The Block and Timmer analysis of Kenya shows that the multiplier of public sector investment in agriculture is far greater than that for non-agriculture—1.96 compared to 0.37 (Timmer 1994). This is consistent with the data for Latin America from Victor Elias showing high rates of return to public sector investment in agriculture (Elias 1985).

Datt and Ravallion (1998) show that public investment is important to agricultural growth. In a regression, they showed that the elasticity of yield with respect to public expenditure was 0.29—a high figure given the large size of agricultural relative to state spending. Thus state spending reduces poverty through its effect on farm yields.

These data show that recent pressures to reduce public sector deficits when applied across the board have a disproportionate effect on agricultural growth. This means that there is a disproportionate effect on the reduction of poverty. Poverty reduction efforts must address this complex issue.

The Explanatory Theory

The preceding data make a powerful case that it is agricultural growth and essentially only agricultural growth that brings about poverty decline in low-income countries that have a substantial agricultural sector. The explanation of this relationship greatly predates the data (see Johnston and Mellor 1961, Mellor and Johnston 1984, Mellor and Lele 1973, Mellor 1976, Mellor 1992).

The following associations require explanation. First, is the association of decline in poverty with agricultural growth (and by indirection, the lack of decline with manufacturing and large-scale service sector growth). Second, is the lags in the full effect of the agricultural growth on employment. Third, is the lack of impact of agricultural growth on poverty reduction when income and assets are highly skewed towards the rich. Fourth, is the rather prompt increase in wage rates in response to high agricultural growth rates—increases that occur far sooner than can be explained by increased labor requirements in traditional agriculture.
We will deal with these associations by discussing food as a wage good, employment directly in agriculture and employment created by the expenditure of increased farm incomes on non-farm goods and services. It is the latter that is most powerful and helps explain all four of the associations noted here.

As an aside, it is notable that foreign aid in the 1950's and 1960's needed no data or explanation of the association—it made agriculture central, as on the basis of common sense, did virtually all macro economists of that generation. The bulk of the population was employed in agriculture and food and food prices were of paramount importance in determining the welfare of the poor.

However, nowadays we have departed so far from the agricultural emphasis that a more sophisticated approach to the data and to the explanation is required to get foreign aid and development strategy back on track. A recent ODI report done for the British foreign assistance program (DFID) notes the general decline and specifically the USAID reduction in assistance to agriculture from $1.2 Billion in 1986 to $240 million in 1997, which is an astounding 80 percent reduction (ODI 1999). This is of course a radical turn away from pro-poor growth.

The explanation of the key role of agriculture in poverty reduction has three elements, each relates to the large size of agriculture in consumption, production, and income.

The earliest literature emphasized agriculture as a producer of wage goods—that is, employment could not increase markedly unless the supply of food, on which most of increased wages were spent, was increased (Lewis 1954, Johnston and Mellor, 1961, Mellor and Johnston 1984). Some have argued that world prices of food are not affected by the growth of individual developing countries. Later literature emphasized agriculture's impact on employment quantity and the wage rate. That literature shows that agriculture is itself a large employer and hence, when it grows employment will increase.

This theory is unlikely to be tested because, as indicated by the above and the following data, employment is unlikely to grow rapidly as a percent of the total labor force unless agriculture is also growing rapidly. For the reasons shown below, agricultural production growth and employment tend to go together.

Fast agricultural growth countries do in fact increase their agricultural imports. That is to say they generate so much employment (and poverty reduction) that their own agriculture can not keep up. However, that is primarily because of rapid growth in consumption of livestock and the inability to keep up with the demand for livestock feed (e.g., Taiwan, China). In any case, the gap is small compared to incremental agricultural growth and can be filled by growth in exports.

Thus, we will proceed directly to the employment impact of agricultural growth. There are two components to consider: (1) employment directly in agriculture, and (2) employment in non-agriculture, but stimulated by the agricultural growth. For the latter it is consumption expenditure that dominates, not the production linkages of traditional literature.

Employment Directly in Agricultural Growth

Agriculture is of course by far the largest employer in essentially all developing countries. Development may be usefully described as an economic transformation in which the size of the agricultural sector declines—indeed the next section will point out that rapid agricultural growth itself accelerates its own relative decline (Mellor 1966).

For poor countries with well over half the labor force directly engaged in agriculture, it will be many decades before agriculture declines to become less important than any other sector. The major sources of employment growth in agriculture are: (1) yield increasing technology; (2) increased land area; (3) a change in the composition of output high value commodities.

Yield Increasing Technology

A major source of growth in poor countries must be technological change in its dominant basic food production sector. Because of land limitations it is yield increasing improved technology that dominates (Ruttan and Hayami). Such technology increases labor productivity as well as land productivity. Most obviously, it takes much less labor to harvest the increased production than the original level of production.

Many studies have been made of the impact on agricultural employment of yield increasing technology. The work of Hanumantha Rao for India is representative (Rao 1975). The elasticity of employment ranges from a high of 0.6 to a low of 0.3. That is, for each 10 percent increase in output, employment at best increases 6 percent and maybe as little as 3 percent. Because an increase of 10 percent from yield-increasing technology alone is likely to take up to three years, and population may have grown by 6 to 9 percent, such increase in employment can not even take care of the natural increase in the farm population, let alone tighten labor markets—there will not be an impact on poverty reduction.

We can not explain the association of agricultural growth with poverty reduction by direct increase in employment within agriculture from high yield technology. If the elasticity is only 0.3 then the situation is far worse. In practice in labor surplus countries with very poor laborers, i.e., much poverty, the elasticity is more likely to be at 0.6 representing no substitution of improved labor saving methods for labor.

Increased Land Area

If the land area can be increased and the poor are large in number, then production will be increased symmetrically—that is, just as much labor will be used on the additional area as on the base area. That provides an elasticity of employment of 1 percent—for each 10 percent increase in production, employment will increase by 10 percent. From an employment point of view that is good, from a growth point of view it is not so good since resource productivity is not increasing. In any case, for most countries it is of at most, modest relevance.

Throughout Asia essentially all the land that can be brought into agriculture has already been brought in. In the 1950's production did grow substantially from increased land area, even in India, but that ran out by the mid-1960's and land expansion is not an important source of agricultural growth. Even in Africa,

often thought of as land rich, the additional land that can be brought into agriculture is generally much less productive than old lands. In any case, average amount of land per farmer is declining in Africa.

An exception to land scarcity in Africa is in the traditionally disease prone areas, where disease control can open large areas for high productivity cultivation—as happened a few decades ago in malaria infested areas of Asia.

Increased Production of High Value Commodities

A much more likely possibility is increase in production of high value commodities—particularly horticulture and livestock. These commodities are highly labor-intensive. Transfer of area from field crops results in a large increase in labor requirements. And, even the expansion of production of these crops is likely to be in the context of very little increase in labor productivity. The increased production occurs because of increased demand and hence it is profitable without increased factor productivity, unlike for basic field crops in which the profit incentive comes not from increased demand but from decreased cost of production.

Thus the elasticity of employment with respect to high value commodities may be close to unity—say 0.9 to allow for some scale economies.

One of the major changes of the past few decades with respect to agriculture in low-income countries is the increase in potential for high value commodities. This increased potential comes from two sources. The major opening of trade potentials with structural adjustment in low-income countries and the GATT rules, allow low-income countries to exploit their potentially powerful comparative advantage in labor intensive agricultural commodities. For horticulture, recent health trends in high-income countries have further expanded this market.

Concurrently, accelerated growth in low-income countries rapidly expands the domestic market for income elastic commodities, particularly livestock products, but also horticulture. These two tendencies feed on each other—larger domestic markets encourage increased output, a portion of which can then be shifted to the high quality export markets.

The result is a potential for 6 to 10 percent growth rates for a major portion of agriculture. Those are rates comparable to what a vigorous non-agricultural sector achieves—and for a very large sub-sector. That makes possible much higher over-all rates of growth in agriculture—more nearly 4 to 6 percent than the 3 to 4 percent that was considered exemplary a few decades ago.

And, high rates of growth in this employment intensive sector expand employment within agriculture at a rapid rate. In a middle-income country horticulture plus livestock will comprise on the order of half of

incremental agricultural output. A simple average with yield increasing technology (the average of 0.9 and 0.6) would give an average elasticity of 0.75. In low-income countries the sum of the high value sub-sectors might be more nearly 25 percent—giving a weighted average elasticity of 0.675.

Employment Growth in Agriculture

Developing countries achieving rapid growth in agriculture now average 4 to 6 percent growth rates. If we take 4 percent for a low-income country and an employment elasticity of 0.675 then employment grows at 2.7 percent, roughly enough to take care of the natural labor force expansion in the agricultural sector, but making no contribution to tightening of labor markets and rising real wages.

In a middle-income country achieving 5 percent growth and an elasticity of .75 for employment growth, employment grows at 3.75 percent, significantly faster than natural labor force growth and hence contributing to modest tightening of the labor market.

It would seem that we can't explain agriculture's impact on labor markets through its own absorption of labor. We have even less explanation of the effect of skewed land distribution and lags. Where the poor are large in number, employment elasticities with respect to output would be at least as high in areas of skewed land distribution as in peasant societies, and employment increase in agriculture would be instantaneous with growth in output. For all of this we must look to agriculture's impact on employment in the non-farm sector.

Agriculture Led Non-Farm Growth

Because the agricultural sector in low-income countries is so large, accelerated growth into the 4 to 6 percent range adds immense purchasing power (Mellor 1992). That is because this growth is substantially driven by improved technology (yield increasing crops of the green revolution) and mobilizes previously under-utilized farm family labor resources within agriculture.

It is the expenditure of this increased income on locally produced, labor intensive, non-tradable goods and services that drives the employment creation, that in turn, explains the poverty reduction. As we shall see, this also explains the lag in the effect of agricultural growth, the fact that highly skewed distribution of income from land removes the poverty reducing effect, and the important wage increasing effect of agricultural growth. Further, the power of this income effect causes a tightening of the labor market that can not be explained by the agricultural growth alone. Because it is the income growth that drives the process, it does not matter that the initial income effect is concentrated in the hands of the middle peasant rather than the poor. The poor benefit in the next round.

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Questions arise about this process. How large is the sector that is driven by agricultural incomes and is it a tradable or non-tradable sector? How employment intensive is this sector, and to what extent is it driven by purchase of production goods and to what extent by consumption goods?

GDP in the Agriculture Driven Sectors

There are two ways to get at the issue of the size of the agriculture driven non-farm sector. One is by surveys of the production pattern, source of demand for output for the sector thought to serve agriculture, and the other is through analysis of the consumption patterns for incremental income of farmers. Neither type of information is well developed. Farmer expenditure data rarely give sufficient breakdown to allow analysis of the relevant parts of expenditure and survey of small business in rural and market town areas are infrequent and usually lacking in the necessary detail.

Delgado spells out in some detail why it is that it is the non-tradable sector that is important to the employment increasing poverty reducing impact of agricultural growth (Delgado 1999). The non-tradable (products and services that do not enter international trade) sector can not be stimulated to growth by international exports.

Currently a major emphasis on stimulating growth in low-income countries is on exports and we ask why can't any stimulus provided by agriculture to employment growth be more easily provided by foreign demand. In some respects the very thought is somewhat silly. Is it reasonable to think that all or even the bulk of incremental demand for the vast labor resources of all low-income countries can come from the high-income countries?

Of course, an important supplement can come from exports and that increment is apt to make the difference between moderate and rapid growth. Also, exports of labor intensive commodities provide the foreign exchange to allow import of capital intensive commodities, thereby allowing domestically available capital to concentrate on labor intensive goods and service. But, in general, much of incremental demand must come from domestic sources.

One might also ask how reasonable is it to think that the bulk of the now widely dispersed population with already existing housing infrastructure can be accommodated in the short-run in the major cities near ports that are essential for competition in international markets? Thus, the issue is not one simply of tradable versus non-tradable.

In any case, peasant farmers spend a high proportion of incremental income on low quality goods and on non-exportable goods and services. Examples are expanded housing, personal services, increased lower level education, increased health services, and local transport. Note that where labor is cheap, prospering farmers hire a substantial addition of labor so as to divert family labor away from farm

production to education, leisure, and marketing activities (Hayami and Kikuchi 1999). These are all non-tradable and are produced primarily by labor with very little capital.

Consumption studies suggest that in middle-income countries, e.g., Egypt, that the sector located in market towns and rural areas has an initial GDP roughly equal to that of agriculture (Mellor 1999). In Africa, with very low-incomes, it may be only one-fifth the size of agriculture (Delgado 1999).

In very low-income societies, with minimal commercial differentiation, as in most of Africa, the multipliers from agricultural growth to the non-farm sector are much weaker than in more differentiated societies. However, Delgado, in a careful analysis for sub-Saharan Africa points out that marginal propensity to consume non-tradable agricultural commodities is very high.

In rural Africa with high transaction costs derived from poor communications systems much of agriculture is non-tradable. That is certainly true of much of livestock and horticulture sub-sectors, but it may well apply to the coarse grains as well. Because these are labor intensive sectors, with high propensities to consume agricultural products, considerable employment is generated within agriculture itself. Thus, an initial boost to income from yield increasing technological change may greatly increase employment through multipliers back into agriculture itself.

In this review the high value, high-income elastic parts of agriculture are counted as agriculture, albeit a part of agriculture the demand for which, importantly, may come from rising farm incomes. Thus, the non-farm sector is seen as more limited, but nevertheless large. But, with this more restricted definition it should be recognized that in very poor societies the employment multipliers from agricultural growth can be quite large because of this circularity back into agriculture.

In middle-income countries the agriculture driven non-farm sector may be as large as agriculture (Mellor 1998). The incremental income in farmers hands will be spent more than proportionately in that sector. That is the income elasticity of demand is well above 1.0

Employment in the Agriculture Driven Sectors

Employment elasticities in the agriculture driven non-farm sectors are high (close to 1.0). Increased output is driven by increasing demand, as long as real wages are constant, there is no incentive to increase labor efficiency. Because very little capital, or land, is employed in this sector virtually all the gross income return is to labor.

Empirically, compared to farming with half as much GDP in the sector, and twice the labor intensity, the initial labor force is the same size as for agriculture. Typically, in low-income countries, about half of base income is spent on production services and locally produced consumption goods (Bell et al. 1980, Hazell and Roll 1983).

With an average income elasticity of demand for these commodities of 1.5, employment expands at 1.5 percent of the base year for each percent increase in the rate of growth of agricultural income. With 5 percent in agriculture the growth rate of employment is 7.5 percent. That compares with agriculture at 5 percent and an employment elasticity of 0.75 of 3.75—the additions to employment in the agriculture-stimulated local non-farm sector is twice that of agriculture. That is the key point about the agricultural growth impact on poverty.

Agribusiness and Consumption Goods

Fertilizer and other chemical and mechanical inputs to agriculture take place in the tradable sector and tend to be imported or produced by capital intensive processes. Increased demand for such goods does not add much to employment and that demand could have been provided from sources other than agriculture. In contrast, the local marketing service for these inputs and for output are labor intensive non-tradables and the increase in demand from agriculture stimulates production and employment that are net additions to the economy that could not come from other sources. That will remain true as long as there is poverty representing inadequate employment opportunity for the wage earning classes.

Studies of marketing margins suggest that the stimulus to the rural and market town non-tradable sector is equal to about 10 percent of the value of incremental agricultural production since a high proportion of incremental production depends on purchased inputs and is marketed.

Consumption studies in Asia show about 40 percent of incremental income is spent on locally produced non-farm goods and service (Hazell et al.). These are all highly labor intensive in their production.

Thus, consumption goods comprise about three-quarters of incremental demand for non-tradable and production services about one-quarter. It is the consumption expenditure that is dominant (Mellor and Lele 1973).

Kulaks and Income Distribution

A substantial literature in the immediate post—green revolution period, stated that the green revolution concentrated incremental income in the hands of the landowning classes, including the middle peasant or kulak class (to use the Marxian term), that the poor did not participate and indeed, the concentration of income led to further concentration of land ownership. That was the basis for much of the anti-green revolution spirit of the 1970's that helped turn foreign aid away from agriculture.

This exposition points out that in fact, increased agricultural incomes in the hands of the middle peasant or kulak has powerful employment linkages, but they take time to operate. The initial studies did not allow for that time and in any case, were only concerned with the direct affect of income growth.

The important point is that an initial skewing of the benefits of agricultural growth towards the higher income rural people is not antithetical to poverty reduction. The issue is not the initial distribution of the increased income, but the expenditure patterns from that income. Middle peasants in low-income countries spend a high proportion locally on non-tradables thereby providing a stimulus to production and particularly to employment that can not be obtained in any other manner.

Delgado carefully documents that in Africa, incomes and commercial differentiation are so low that the non-farm goods and services receive relatively little stimulus, but that the increment to demand for agricultural non-tradables is very large, stimulating a large increase in demand-driven production of high-value agricultural products (livestock and fruits and vegetables), and even for some non-tradable basic staples. Thus, an initial stimulus to agricultural growth from technological change (high yielding varieties of basic staples) has strong multipliers back to other sectors of agriculture that are highly labor intensive. The effects are precisely as described for the rural and market town non-farm sectors.

When Do Real Wages Rise and Employment Elasticities Decline?

The empirical data show rising real wage rates as a significant factor in declining poverty. In practice, the statistical techniques do not catch employment quantity because there are no measures available. They catch the effect of employment separately only through the increment in real wages.

As long as there is underemployment in rural areas, roughly synonymous with poverty, real wages will not rise. Thus, it is surprising that the data catch real wage increases.

Increased production of basic agricultural commodities that are non-tradable will result in declining real price of that output unless effective demand increases through increased employment. The statistical studies do catch an effect of declining real prices of basic food staples. That is because much of the change in production is large annual fluctuations due to weather rather than the steady effect of technological change. In the case of the former, employment can not increase sufficiently rapidly to make effective demand for all the increment in production. But, the steady increase of technology driven output growth can be matched by roughly commensurate increase in demand through increased employment of the poor who spend a high proportion of increased income on basic food.

Thus, the poor benefit from increased basic food staple output either through lower prices or increased employment. The latter is in fact more certain in peasant agriculture because the basic food may in fact be tradable (although trade economists like to exaggerate that for low-income countries) eliminating the price decline.

Now, we return to the real wage story. What the data are telling us is that the labor market tightens surprisingly quickly. Why? Because of the immense increase in employment in the local non-farm sector. The poor benefit as employment increases and then again as real wages rise. That is why poverty declines so rapidly with increased agricultural output.

When real wages rise it pays to increase labor productivity. That will happen in both the farm production sector and the rural and market town non-farm sector. In practice, raising labor productivity is low-cost in both these sectors. So again, we find that statistical evidence of steadily rising real wages with agricultural growth shows how powerful the employment multipliers must be. For that to be the case the effect must come substantially from the non-farm sector because the increase in labor productivity is so automatic in the basic staples area.

Employment Numbers

It is difficult to estimate the actual employment numbers for the indirect effects of agricultural growth because statistics are not kept for the composition of the rural and market town non-farm sectors, and what data there are, are not broken down by sources of effective demand. Hence we have little data on the size of the sector in GNP terms or of the employment context. However a rough approximation can be made of these numbers. Such estimates are large and fully in keeping with the clearly measured impact of agricultural growth on poverty reduction.

Mellor has made a careful estimate for Egypt. The Agricultural Perspective Plan for Nepal makes a set of estimates for Nepal.

Egypt

Estimates have been made for Egypt (Mellor 1999) for the impact on poverty of the structure of growth in a pre-reform period (early 1980's) when agricultural output growth was slower than the labor force growth (-0.2 percent per capita); for an early reform period when the agricultural growth rate significantly exceeded the labor force growth rate (1.0 percent per capita); and a projected future period of full implementation of reforms, providing an agricultural growth rate of 2.7 percent per capita. Calculations were made of the size of the farm income driven non-farm sector, the incremental expenditure on farm driven non-farm production, and the effect on employment.

Table 1 shows the results from those calculations. When agricultural growth was less than the labor force growth rate, the annual increments to employment from agricultural growth were small and total employment growth was far less than the labor force growth. Poverty increased. In the full reform

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period of high agricultural growth, employment increases far faster than labor force growth so that real wage rates would rise.

Table (5) Annual Increments to Employment, by Sector, 1980/81-2005/6

Sector	Pre-Reform 1980/81-1985/86	Early Reform 1997/98	Mature Reform 2001/2-2005/6
Agriculture	37,950	100,122	146,164
Agri. Driven non-agr.	108,810	340,875	581,175
Autonomous non-agr.	17,707	43,350	45,084
Total Employment	164,467	484,347	772,423
Annual Additions to Labor Force @ 2.7 %	480,060	480,06	549,080

Source: (Mellor 1999) See original source for full explanation of derivation of numbers in the table.

In the fast growth period when agriculture and non-agriculture were growing rapidly, agriculture's direct and indirect effects accounted for 70 percent of employment growth, while the sectors autonomous from agriculture generated 77 percent of GDP growth. Because these are all market price driven forces they are all in economic equilibrium and one can not in a neo-classical context say that one form of growth is better than others; but the agricultural growth contributes most to employment growth. And, the agricultural growth does require government interventions.

In the case of Egypt, those interventions are first to restore market forces to operation thereby freeing agriculture to expand. It also requires direct government action expanding and improving research and extension institutions, rural education, rural infrastructure and all the other elements that rely on public expenditure for creating a favorable environment for private investment in agriculture.

Nepal

The government of Nepal has instituted a long-term development plan, termed the Agricultural Perspective Plan (APP) (Nepal, Government of, 1995). The APP is backed by a Growth Accounting Framework (GA) that incorporates data for the inputs called for in the plan, the calculation of an agricultural growth rate, which includes the effects of the multipliers of agricultural to non-agricultural growth and transformation of that growth rate into a decline in poverty. The latter is based on the assumption that the distribution of income will not change, and it is a reasonable assumption given not only the wealth of studies referred to earlier that support the assumption that distribution of income is quite rigid, but it is also a conservative assumption given the evidence the rapid agricultural growth improves the distribution of income).

The APP accelerates the agricultural growth rate from the 3.1 percent for 1984/85 to 1993/94-pre-APP period to 4.8 percent by the end of the 20-year plan. It should be noted that prior to the APP, the proportion of the population under the poverty line was steadily rising as agriculture stagnated. As an indication of the latter, Nepal in the 1970s had the highest yields in South Asia for the principal field crops (just prior to the institution of the APP it had the lowest). Nepal had been left out of the dynamic process of agricultural growth that ran through Asia. In that sense it was very like an African country.

The APP GA shows the percent of the rural population falling under the poverty line declining from 49 percent to 14 percent in the 20-year period of the APP. The absolute number of the rural poor would be reduced from 9.3 million to 3.8 million in that period. That is the absolute number is more than cut in half.

Programs to Reduce Poverty

It is clear from the preceding, what the first prong of a poverty reduction program must be to achieve those high agricultural growth rates that will reduce poverty by half in some 15 to 20 years. The direct action programs can then be effective within that context.

The agricultural production program must have three parts: (1) it must ensure a rapid pace of technological change to reduce production costs and increase production; (2) it must ensure rapid expansion of rural infrastructure to reduce transaction costs and assist the growth of high-value commodities; (3) it must ensure broad participation in growth so that the aggregate growth will be large, and include the participation of small farmers and women, both of which require special attention. The latter measure would also directly assist the poor.

Next, attention needs to be given to ensure that increased demand for employment intensive non-farm activities can elicit a ready response.

In order to ensure high growth rates in agriculture, attention must be given to ensure broad participation—of women, those with small farms, and cover broad geographic areas.

Finally special programs are needed for the residual, but still large numbers of poor. These programs should focus on geographic areas that are non-responsive to modern yield increasing technology, education of the poor to ensure participation, and health programs for their direct contribution to the well being of the poor, and ensure broad labor market participation. Programs may also be needed to ensure food security in times of short crops, associated low employment rates, and food scarcity.

It is now feasible to achieve much higher agricultural growth rates than were considered the norm only a few decades ago. Then growth rates of 3.0 to 3.5 percent were considered quite substantial, and only reflected 1.0 to 1.5 percent rates of growth per capita. Now, fast agricultural growth would be considered more nearly 4.0 to 6.0 percent (Mellor).

It is ironic that just when so much more can be achieved in agricultural growth and at a time when its role in poverty reduction is understood, the foreign assistance community has drawn back from pressuring for and assisting agricultural growth.

When and Where Does Agriculture Fail

Skewed Income Distribution

The most intractable poverty problem occurs where incomes are highly skewed to the rich. Agricultural growth does nothing for the poor in such circumstance, nor does any other growth related approach. What is most needed is radical redistribution of assets. Failing that education will assist the poor to leave for other countries, or eventually increase job opportunities in their own urban areas. However, in poor countries that will take a long time. This is the only discouraging feature on the poverty mitigation front.

Unresponsive Areas

The problem of geographic areas that are unresponsive to improved crop technology and ill suited to high value products is currently intractable. Every effort needs to be found for adapting such areas to improved technology and high value commodities.

In that circumstance it is better to invest where the returns in increased incomes are higher. Because job formation from such increased incomes is disproportionately in the market towns, the scope to absorb migrants from less advantaged areas is great. Thus, what is needed is increased education in the less responsive areas to facilitate migration (see the work of Ravallion on this issue).

What is New About What Needs to be Done?

The explosion in trade and global income mean that agriculture can grow at a 4 to 6 percent rate (50 percent higher than what was conceivable three decades ago) even while domestic incomes are too low to make large markets for high value commodities.

Knowledge of agricultural development has exploded and growth can accelerate far faster than in the past. That new knowledge ranges from the awareness of the need to broaden participation in growth, understand the role of fertilizer productivity, as well as supply, and know the scope for trade and the role of macro policy.

Capital flows to developing countries can be far greater than in the past, freeing national savings and public expenditure for greater emphasis on rural technology, infrastructure and education—if governments choose to do so.

Democratization to the village level opens up far greater potentials for raising local resources and managing them better. Thus, just as we come to fully understand the critical role of agricultural growth in poverty reduction, our knowledge of how to achieve that growth has multiplied. Now is the time to undo urban bias and get on with poverty reduction. To do so, we must call a spade a spade—it is agricultural growth that initially drives poverty reduction.

Causes of Increased Potential for Agricultural Growth

Three major changes explain this greatly increased potential for agricultural growth: (1) greater knowledge; (2) greater capital availability; and (3) more open global markets for high value agricultural commodities.

A Greater Knowledge Base

(1) Although not significantly utilized in foreign aid programs, the knowledge of how to develop agriculture has burgeoned since the 1950's. We have not only a clearer view of the strategic needs, but immense detail on how to run credit programs—we know what works and what doesn't. We have better awareness of the appropriate role for government vis-a-vis the private sector, and of course we have a far greater knowledge of the basic science for bringing about yield increasing technological improvements.

The potentials for biotechnology are immense and just beginning to be tapped, albeit particularly underfunded for the problems of low-income countries (Science, 1999). On the social science side, the review of postwar literature on development has over 4000 references divided over Asia, Africa, and

Latin America (see Eicher and Baker, Mellor and Mudahar, and Schuh and Brandao respectively in Martin (1992). With the slackening of foreign aid interest in agriculture, the pace of knowledge generation for agricultural and rural development has of course slowed, but there is an immense backlog of under-utilized knowledge and new knowledge generation has not halted.

Capital is More Available

(2) International capital flows are now at levels undreamed of when the Asian countries began their takeoff. Although international capital is not likely to cover a significant portion of the direct needs of the agricultural sector, it can relieve other financial pressures on low-income country governments so that many more resources can be freed for investment in agricultural research and infrastructure than was possible in the early days of the Asian breakthroughs.

Of course, to say that capital need not be limiting, is not say that it is not limiting. Governments must recognize the importance of agriculture, follow liberal policies to encourage capital flows, and then fully invest their own funds in agriculture. Foreign aid can do much and may indeed be critical in strengthening the national forces that understand these relationships. In the past, foreign aid responded in Asia. Foreign aid needs to start responding in Africa.

Low-income countries with large natural resource exports, e.g., oil, diamonds, can not simply expect the generation of those resources to result in the employment growth rates that reduce poverty, particularly rural poverty. Such resources are valuable for reducing poverty if they are invested in agricultural growth that in turn creates the employment multipliers that reduce poverty. The contrast between Indonesia that used oil revenues, at least in part, for massive investment in rural roads and education, and Nigeria that did not, is instructive.

High Value Commodities Have Greater Potential

(3) And perhaps most important in quantitative terms, production of high value commodities, particularly horticulture and livestock, which can grow more rapidly than in the past. Production of high value commodities is important to agriculture, because agriculture tends to be land-constrained; therefore increasing yields through technology and value of output per unit through enlarged markets lessen that constraint.

As domestic growth reaches high levels the high-income elasticities for these commodities result in rapid growth in demand. But, now with international trade far more free than in the past, and promising to become even more open, domestic production of high value commodities can grow far more rapidly than domestic demand.

By definition, high value commodities use little land. Therefore, abundant labor can result in growth rates of output of 6 to 10 percent. Because high value commodities initially comprise some 20 percent of the value of agricultural output and gradually rise to well over 50 percent, it is a cause of major acceleration in the agricultural growth rate.

Tremendous growth in the global economy, substantial in part, because of the takeoff in Asia, has greatly increased the market and the price responsiveness of demand for traditional high value tropical exports. Now, that potential is also greater than it used to be. Because Africa has not exploited these potentials, it is the great loser, while Asian countries, particularly Malaysia and Indonesia, have benefited immensely from rapid growth in exports of these commodities.

Conclusions - Poverty Policy in Brief

Thus, we have solved the conundrums of why growth does not always bring down poverty levels. We show what is the wrong structure, why the right structure takes time; that the effects are indirect and that they must work their way through the system. We show why so much of the world is finding its way out of poverty—all of Asia for example, because agriculture got going in those areas, and we show why poverty reduction is slowing in those same areas. In Asia agricultural growth has received much less attention in the last decade and despite considerable institutionalization it has slowed, a slowing reinforced by foreign aid pressures for indiscriminate budget cuts. We show why Africa has been such a disaster from a poverty-reduction point of view—over the past two decades foreign aid stopped pressuring for emphasis on agriculture. And we show why foreign aid is so important to getting agriculture going—because government actions are critical to agriculture and low-income country governments tend to be strongly urban biased.

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